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**ABSTRACT**

A system and method for determining and predicting a patient's susceptibility to neurological dysfunction based on measured electrophysiological parameters employs a self-contained implantable device with depth electrodes implanted in desired locations in the patient's brain. The patient's neurological tissue is stimulated to determine excitability and refractoriness (or inhibition period) parameters, which are employed to identify susceptibility to abnormal neurological activity, particularly epileptic seizures.